AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph starting on page 3, line 5 as follows:

A1

Suppose a linear antenna array has L antennas as shown in FIG. 1 and each antenna has a complex weight ω_i ($i = 1, 2, \ldots, L$), a signal transmitted in a direction θ is proportional to

$$\underline{w}^H \underline{a}(\theta)$$

..... (1)

where $\underline{w} = [w_1 w_2 \ldots w_L]^T$ is a weight vector, $\underline{a(\theta) = [1e^{j2\pi\frac{d\sin\theta}{\lambda}} \mathrm{K}\ e^{j2\pi\frac{(L-1)d\sin\theta}{\lambda}}]^T}$ $\cancel{\underline{a}(\theta) = [1e^{j2\pi\frac{d\sin\theta}{\lambda}} \cdots e^{j2\pi\frac{(L-1)d\sin\theta}{\lambda}}]^T}$ is an array vector, H represents Hermitian, T represents transpose, d is the distance between antennas, and λ is the wavelength of a carrier frequency. The array vector refers to the relative strength and phase of a signal transmitted from each antenna to a remote destination in the direction θ, as expressed in vectors.

Please amend the paragraph starting on page 8, line 11 as follows:

A2

According to the matching filter theory, an optimal weight vector that brings a maximum output SNR at a receiving end of the mobile station is

$$\cancel{\underline{w}^{\circ} = \arg^{\max}_{\underline{w}} \underline{w}^H H^H H \underline{w}}$$

$$\underline{\underline{w}^{\circ} = \arg^{\max}_{\underline{w}} \underline{w}^H H^H H \underline{w}} \text{ subject to } \|\underline{w}\|^2 = P$$

where $H = [\underline{h}_1 \underline{h}_2 \underline{h}_3]$

..... (7)

where P is transmission power, w° is an optimal weight vector, and $\underline{h}_1, \underline{h}_2, \underline{h}_3$ are channel vectors for the paths. The solution of Eq. 7 is set as a maximum unique vector corresponding to the maximum unique value of a transmission correlation matrix $H^H H = \sum_{i=1}^{3} |\beta_i|^2 \underline{a}(\theta_i)\underline{a}(\theta_i)^H$.

Please amend the paragraph starting on page 16, line 4 as follows:

In Eq. 11, $H = [\underline{h}_1, \underline{h}_2 \ldots \underline{h}_M]^T$, $\underline{n} = [n_1, n_2 \ldots n_M]^T$, and ~~$s(t-\tau_1) = s(t-\tau_2) = ? = s(t-\tau_M)$~~ $\underline{s(t-\tau_1) = s(t-\tau_2) = \Lambda = s(t-\tau_M)}$. Here, $s(t-\tau_1)$, $s(t-\tau_2)$, …, $s(t-\tau_M)$ are termed s. It is assumed that the length of a symbol in the received message is greater than any path delay.

A3

Please amend the paragraph starting on page 19, line 13 as follows:

A4

Suppose $\beta_i[k]$ is a forward fading coefficient for an ith path at a kth time point (the present time point). By a linear combination of V fading coefficients, $\beta_i[k-D]$, $\beta_i[k-D-1]$, …$\beta_i[k-D-V+1]$, $\beta_i[k]$ is estimated to

$$\hat{\beta}_i[k] = \sum_{v=0}^{V-1} b_v \beta_i[k-D-v] \quad \ldots\ldots (16)$$

~~where if a definition is given as $\underline{b} = [b_0, b_1 ? b_{V-1}]^T$ and $\underline{\beta} = [\beta_i[k-D]\beta_i[k-D-1] ? \beta_i[k-D-V+1]]^T$, the equation 16 is~~

~~To obtain a coefficient vector β, a value β which allows $E(\beta(k)\text{-}^\wedge\beta)^2$ to be a minimum value, should be calculated. Thus, the coefficient vector $\underline{b}$ is~~

<u>where if a definition is given as $\underline{b} = [b_0, b_1 \Lambda\ b_{V-1}]^T$ and $\underline{\beta} = [\beta_i[k-D]\beta_i[k-D-1]\Lambda\ \beta_i[k-D-V+1]]^T$, the equation 16 is $\hat{\beta}_k(k) = b^T \beta$</u>

<u>To obtain a coefficient vector β, a value β which allows $E(\beta(k)\text{-}^\wedge\beta)^2$ to be a minimum value, should be calculated. Thus, the coefficient vector $\underline{b}$ is</u>

$$\underline{b} = R^{-1}\underline{p} \quad \ldots\ldots (17)$$

according to the linear prediction method.

Please amend the paragraph starting on page 20, line 21 as follows:

A5

However, the above procedure is not applicable because the average of the forward fading severities is not zero. A zero-average forward fading severity can be defined as

$$\delta_i = |\beta_i| - E[|\beta_i|] \qquad \text{.....(19)}$$

and $|\beta_i[k]|$ is estimated by a linear combination of $\delta_i[k-D]$, $\delta_i[k-D-1]$, ..., $\delta_i[k-D-V+1]$ as

$$|\hat{\beta}_i[k]| = \sum_{v=0}^{V-1} d_v \delta_i[k-D-v] + E[|\beta_i|] \qquad \text{.....(20)}$$

~~where if $\underline{d} = [d_0 d_1 ? d_{V-1}]^T$ and $\underline{\delta} = [\delta_i[k-D][\delta_i[k-D-1] ? [\delta_i[k-D-V+1]^T$, the coefficient vector $\underline{d}$ is calculated by~~

where if $\underline{d} = [d_0 d_1 \Lambda\ d_{V-1}]^T$ and $\underline{\delta} = [\delta_i[k-D][\delta_i[k-D-1]\Lambda\ [\delta_i[k-D-V+1]^T$, the coefficient vector $\underline{d}$ is calculated by

$$\underline{d} = R^{-1}\underline{p} \qquad \text{.....(21)}$$

according to the linear prediction method.

Please amend the paragraph starting on page 33, line 6 as follows:

A6

The previous forward fading information is read from the memory 513. A group of V delayed forward fading coefficients $\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda\ , \beta_i^F[k-D-V+1]\}$ or $\{|\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda\ , \beta_i^F[k-D-V+1]|\}$

~~$\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}$ or~~

A6

$\cancel{\{|\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]|\}}$ are formed from the previous forward fading information.

Please amend the paragraph starting on page 33, line 18 as follows:

A7

In step 819, each current forward fading estimator 508 receives the forward fading coefficient, the average reverse fading power and the Doppler frequency obtained by reverse fading estimation for each path and estimates a current forward fading for each path, and each power calculator 509 calculates forward fading power for each path. The current forward fading estimator 508 forms the group of V delayed forward fading coefficients $\cancel{\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}}$ $\underline{\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda\ , \beta_i^F[k-D-V+1]\}}$ or the group of V delayed forward fading severities $\cancel{\{|\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]|\}}$ $\underline{\{|\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda\ , \beta_i^F[k-D-V+1]|\}}$ from the previous forward fading information read from the memory 513.

Please amend the paragraph starting on page 34, line 1 as follows:

A8

In the case of the forward fading coefficient group, the current forward fading estimator 508 estimates the current forward fading coefficient $\{|\beta_i^F[k]|\}$ using $\cancel{\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}}$ $\underline{\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda\ , \beta_i^F[k-D-V+1]\}}$, $\{E|\beta_i^R|^2\}$, and $\{f_{D,i}\}$ for a corresponding path by the linear prediction method shown in Eq. 16, Eq. 17, and Eq. 18. On the other hand, in the case of the forward fading severity group, the current forward fading estimator 508 estimates the current forward fading severity $\{|\beta_i^F[k]|\}$ using $\cancel{\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}}$ $\underline{\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda\ , \beta_i^F[k-D-V+1]\}}$, $\{E|\beta_i^R|^2\}$, and $\{f_{D,i}\}$ for a corresponding path by the linear prediction method shown in Eq. 20, Eq. 21, and Eq. 22.

Please amend the paragraph starting on page 38, line 5 as follows:

A9

In step 1017, each current forward fading estimator 508 receives the forward fading coefficient, the average reverse fading power, the Doppler frequency and estimates a current forward fading for each path. That is, each current forward fading estimator 508 reads the previous forward fading information from the memory 513 and forms a group of V delayed forward fading coefficients $\cancel{\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}}$ $\underline{\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda, \beta_i^F[k-D-V+1]\}}$ or a group of V delayed forward fading severities $\cancel{\{|\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]|\}}$ $\underline{\{|\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda, \beta_i^F[k-D-V+1]|\}}$ from the previous forward fading information.

Please amend the paragraph starting on page 38, line 15 as follows:

A10

In the case of the forward fading coefficient group, the current forward fading estimator 508 estimates the current forward fading coefficient $\{|\beta_i^F[k]|\}$ using $\cancel{\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}, \{E|\beta_i^R|^2\}}$ $\underline{\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda, \beta_i^F[k-D-V+1]\}}$, $\{E|\beta_i^R|^2\}$, and $\{f_{D,i}\}$ for the corresponding path by the linear prediction method shown in Eq. 16, Eq. 17, and Eq. 18. On the other hand, in the case of the forward fading severity group, the current forward fading estimator 508 estimates the current forward fading severity $\{|\beta_i^F[k]|\}$ using $\cancel{\{\beta_i^F[k-D], \beta_i^F[k-D-1], ?, \beta_i^F[k-D-V+1]\}}$ $\underline{\{\beta_i^F[k-D], \beta_i^F[k-D-1], \Lambda, \beta_i^F[k-D-V+1]\}}$, $\{E|\beta_i^R|^2\}$, and $\{f_{D,i}\}$ for a corresponding path by the linear prediction method shown in Eq. 20, Eq. 21, and Eq. 22.